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valleys are heavily timbered up to elevations of 1,200 to 1,500 feet above sea-level, spruce being the most plentiful variety and the most valuable for commercial uses. In the lowland the characteristic vegetation is light, scattered timber with open, grassy meadows. Native hay is available for forage. Vegetables are raised for local consumption at Seward and other favorable points. Game is abundant. Indeed, Kenai Peninsula has been described as one of the few big-game countries combining accessibility and abundance of forms. The chief examples are moose, mountain sheep and black and brown bears. The streams and lakes in the mountainous eastern half teem with trout. Salmon is caught on the Cook Inlet side, where a number of canneries have been established.

RAILROADS IN TURKEY

(With map facing p. 936.)

The broad Eurasian landmass contains three densely populated areas. Of these Central Europe is the westernmost. The Indian Peninsula follows, situated approximately midway between the European area and the coast-lands and islands of eastern Asia, which form the easternmost of the three. In these three regions only does the average density of population exceed 64 inhabitants to the square mile. The speediest and most convenient routes between the westernmost and the two Asiatic regions must inevitably cross Turkey. This feature, together with the fact that Asiatic Turkey is a land richly endowed with natural resources and that, although lying at Europe's very door, it is still undeveloped, confer upon Turkish railroads an importance which has always been keenly realized by enterprising business men the world over.

All travel between Europe and Asia is deflected into northern and southern channels by a central mass of mountains which separate a vast lowland of plains and steppes on the north from the table-lands of southern Asia. Age-old avenues of human migration and of trade in the northern area have the disadvantage of traversing sparsely inhabited regions. To build transeontinental railroads along this route implies scaling some of the highest mountain ranges in the world in order to tap the populous centers of India. Although the feat is not beyond the engineer's ability, it cannot be taken into consideration by the capitalists who supply construc-

tion funds. Southern routes, on the other hand, link with the seas that set far inland on Asiatic coasts. The function of the Turkish trunk lines is to provide the shortest connection between European railways and the steel tracks of southern Asia or to connect with the sea routes that link harbor to harbor from the Persian Gulf to the China Sea.

Once completed, the Turkish lines will provide land connection between Europe on the one hand and Asia, as well as Africa, on the other. Barring a short mile of water at the Bosphorus, the track will be continuous from the shores of the North Sea to the coast of the Persian Gulf. The construction of a bridge across the Bosphorus would make it possible to haul the same car from the one sea to the other. The Turkish railroads will also link European systems with the Cape-to-Cairo line. Unbroken rail connection between any European point and the Cape of Good Hope, via Constantinople, Aleppo and Cairo, will thus be possible.

Since Turkey is the seat of through routes, its railroads play a great part in international transportation. Hence it is that the Turkish lines, with the exception of the Hejaz railroad, have been controlled by financiers grouped according to nationality. At present the majority of shareholders in each of the concessions belong to one or the other of the great European powers.

Englishmen were the first to engage in Turkish railway building. The Aidin railroad, which links the thriving port of Smyrna to the Anatolian plateau at Dineir, represents an investment of about \$50,000,000, or about a third of the money invested in Turkey by the British public. Its construction began in 1856. This road taps the fertile Meander valley and has proved a remunerative undertaking to its owners, although it has not been subsidized by the Turkish government. The line is credited with the best management in Turkey. Its well-ballasted track and the splendid condition of its rolling stock impress the traveler most favorably. English capital is also represented in the other lines built in Turkey, though only as minority holdings.

Italy's connection with Turkish railroads has consisted in providing labor and in laying claim to franchises in southern Asia Minor. Specifically the Italian demands cover the sole right of building lines inland from the Gulf of Adalia and of connecting them with the British and German roads on the north and east. These claims are of recent date, and have been put forth since the occupation of the islands of the Dodecanesia by Italian troops.

The most important road in Turkey is the partially completed trunk line running diagonally across Asia Minor and beyond into Mesopotamia. The line is German-owned, although French and English capital is represented among its shareholders. The concession for the first stretch, extending from Constantinople to Konia, had been granted to German and Austrian railroad builders in 1888. The celebrated Bagdad railroad is the prolongation of this line. Its construction was turned over to German promoters by a *firman* (decree) dated January 21, 1902. The financial burden of the enterprise was estimated at about \$200,000,000.

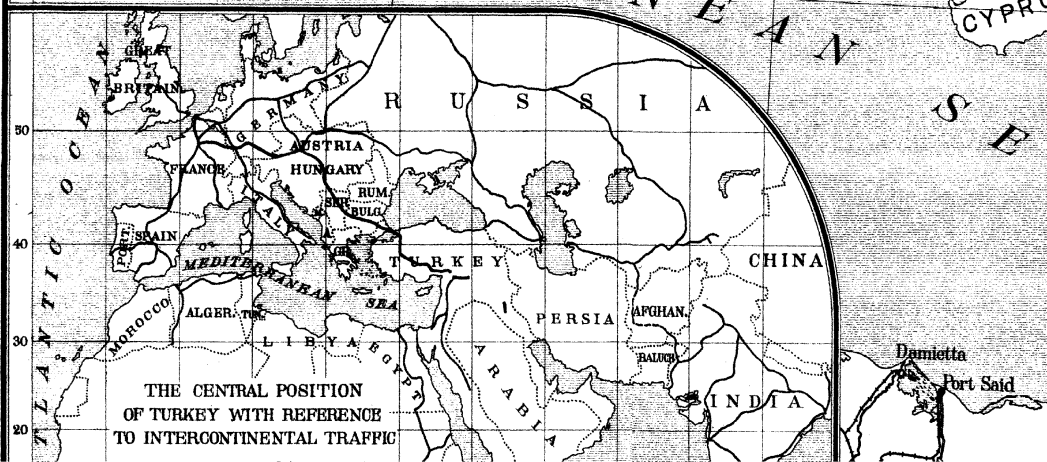
Starting from Konia the line was prolonged in a southeasterly direction to connect with the Mersina-Adana railway. From the Cilician plain the track crosses the northern portion of the Syrian desert, whence, striking south, it invades the fertile lowlands of Mesopotamia. Its terminus will be a port on the Persian Gulf. Between Konia and Bagdad the only heavy work of construction is encountered in the crossing of the lofty Cilician Taurus and Amanus ranges. In both cases it was necessary to drive tunnels. The Amanus tunnel was completed this summer¹ and it is expected that the Taurus underground section will be open to traffic in 1916.²

By acquiring mastery over this trunk line the Germans had succeeded in taking a first mortgage on Turkey. It was the first signal success of the policy of directing Teutonic ambitions into Eastern channels which Bismarck had adopted immediately after the consolidation of the German Empire. His foresight beheld the vision of an all-German line of traffic starting at Hamburg and crossing the Bosphorus towards the Far East. In one direction German calculations miscarried. Germany was unable to finance the undertaking without the support of British and French capitalists. The international character of the line became more and more pronounced between the years 1908 and 1911. During this period a number of agreements were signed between Great Britain, France, Germany and Turkey in which a notable percentage of German interests passed over to the two rival countries, the Germans emerging out of the transaction with a bare majority.

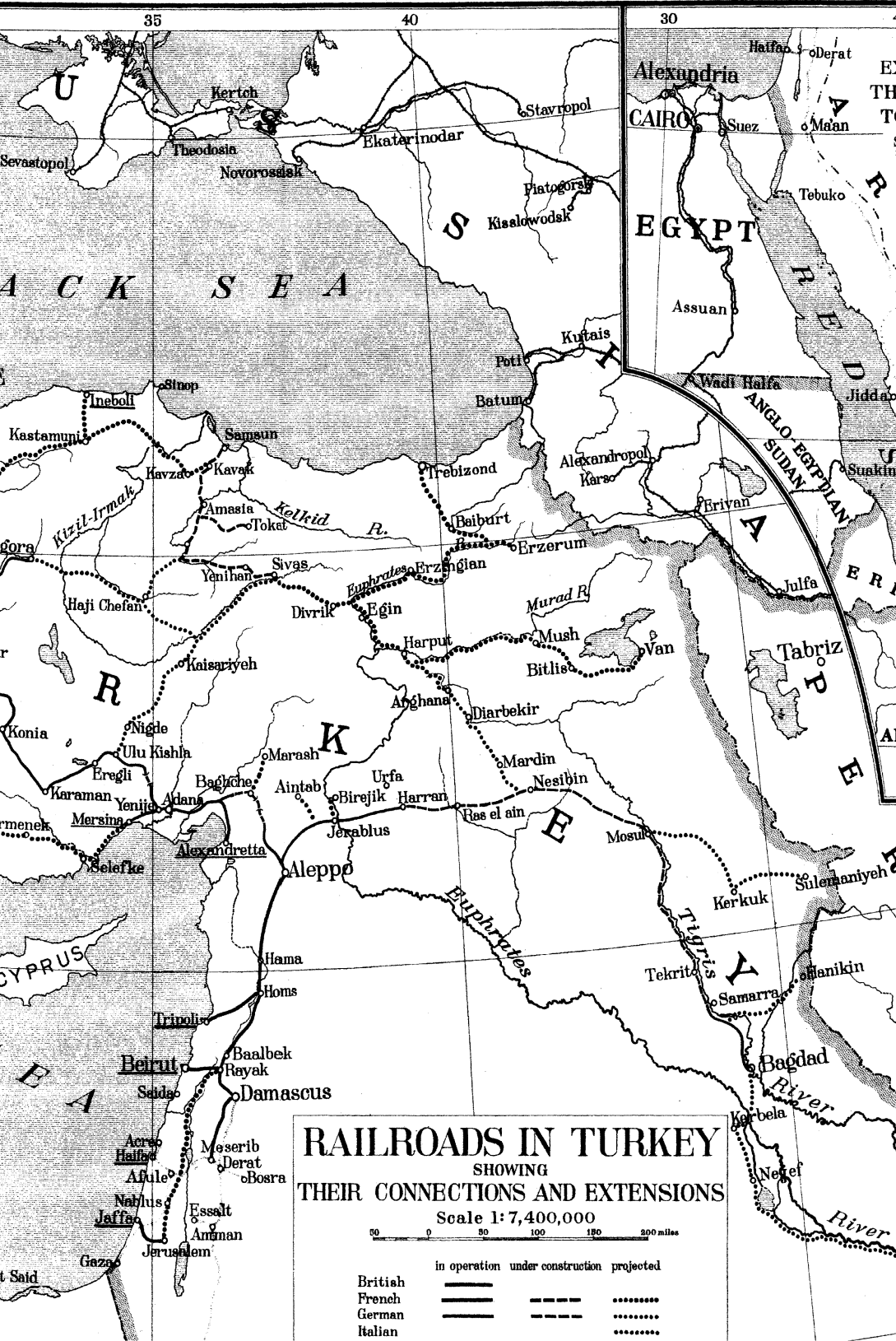
The project of an all-German route received another set-back by the award to England of the final section of the Bagdad line. This successful stroke of British diplomacy consolidated British

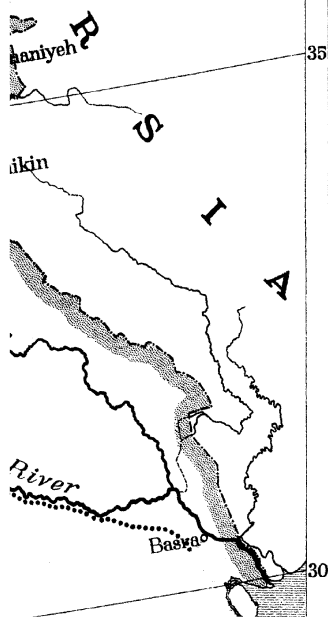
¹ C. Rabot: *État d'avancement du chemin de fer de Bagdad*, *La Géogr.*, Vol. 30, 1915, No. 4, pp. 286-288.

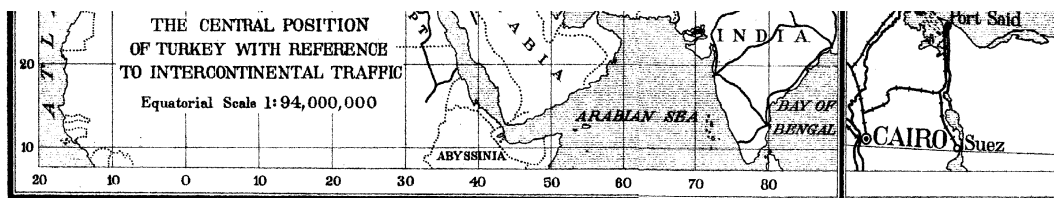
² S. F. Newcombe and J. P. S. Greig: *The Baghdad Railway*, *Geogr. Journ.*, Vol. 46, 1914, No. 6, p. 587.

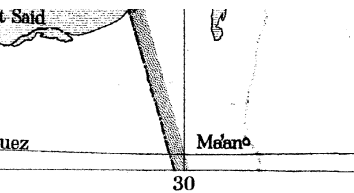


THE CENTRAL POSITION
OF TURKEY WITH REFERENCE
TO INTERCONTINENTAL TRAFFIC





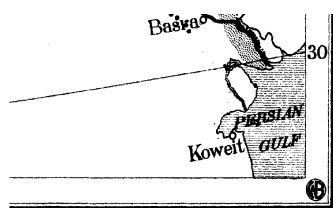




British ————
 French ————
 German ————
 Italian ————
 Turkish ————
 Lines beyond Turkish area ———— tunnels
 Harbor concessions underlined according to nationality

40

45



influence in the Persian Gulf. Koweit and the environing districts ruled by petty Arabian chiefs became British protectorates and the long-planned German through-line merely butted against a solid wall raised by British ability.

The French have invested twice as much capital as the English in Turkish railroads. The lines they manage and own directly are the Syrian railroads and the Smyrna-Kassaba line. They are also interested in the construction of roads in the northeastern districts of the country where concessions have been awarded to Russians. Muscovite inability to provide capital is responsible for the transfer of the building and operating grants to Frenchmen.

French builders first undertook to connect the province of Lebanon with the sea by constructing the Beirut-Damascus line. The tracks were subsequently extended to Aleppo, a city whose greatness was founded on its situation along the natural road which connects the Mediterranean with the Persian Gulf. As a railroad center Aleppo's future looms bright, for the city lies also in the path of the tracks which will connect the Black Sea with the Mediterranean.

In southern Syria, the outlook for French enterprise was dimmed for a few years by the construction of a Turkish line from Damascus southwards. Branch lines were carried to the sea. Harbor concessions, however, were granted to French firms. French interests thus retained a notable share of the control over the traffic directed in and out of Syria. Furthermore, a concession for a line from Rayak to connect with the Jaffa-Jerusalem road which they obtained in 1914 will enable them to compete with the Hejaz line.

The last railroad agreement between the French and Turkish government was signed on April 9, 1914. Concessions on the part of the Turkish government are bestowed in return for French financial support. The lines granted will tap northern Anatolia and Armenia. Connection with the German lines will be made at Boli and at Arghana. The area tributary to this line contains fertile plains and plateaus. It is known to be rich in mines, notably in copper. The advent of the engine will undoubtedly brighten the outlook of the Turkish mining industry.

In southern Arabia, a railroad concession had been awarded to French promoters in 1908. The line was to connect the seaport of Hodeida with Sana'a. It was intended to divert into Turkish territory the large trade with the interior which now passes through Aden. Strategic reasons also weighed heavily in the decision to

build this road. At no time have the Arabs of the Yemen shown sympathy for their Turkish rulers. Every commander sent to quell their incessant rebellions ascribed his failure to lack of transportation facilities. It was mainly in view of this condition that steps were taken to connect this section of the Arabian table-land with the sea.

The only line owned by the Turks in their country is the narrow-gauge railway known as the Hejaz line which starts from Damascus and is intended to attain the holy town of Mecca. The financing of this line has been unparalleled in the annals of railroad building. Ostensibly the purpose of the construction was to provide traveling conveniences to the 250,000 pilgrims who, it is estimated, come annually from all parts of the Mohammedan world to worship at the Kaba'a. In the belief of many, the line was built for strategic reasons and to enforce Turkish sovereignty among the Arabs, who have always been loath to admit the Sultan's claims to the caliphate.

The funds for the construction and equipment of the road were obtained by appealing to the religious feelings of the 230,000,000 Mohammedans scattered in widely separated regions of the globe. Stress was laid on the pious character of the undertaking. According to reports, \$14,000,000 were collected soon after the enterprise was launched. Thereafter about \$12,000,000 were contributed annually for a few years. The operation involved no responsibility to the promoters, headed by Abdul Hamid, the former Sultan of Turkey, all the funds being bestowed in the form of donations. The road has thus no shareholders and no bonded indebtedness, its capital being spontaneously wiped off.

The religious character of the undertaking is apparent in the mosque-wagon attached to each train. Seen from the outside, the prayer carriage is distinguished only by means of a diminutive minaret six and a half feet high. The interior is fitted out according to religious custom with rugs on the floor and framed Koranic verses in letters of gold on the walls. The direction of Mecca is indicated by a map at the end of the car, so as to enable the faithful to orient themselves properly when engaged in prayer.

The war brought fresh impetus to railroad construction in Turkey. Recent accounts describe work on the Bagdad line as being actively pushed. The strategic importance of this trunk route accounts fully for the rush of construction. The success of future expeditions against Egypt depends on its completion. Rail communication between southern Syria and Constantinople is still impeded by the

unfinished state of road-building in the tunnels which will pierce the Taurus and Amanus ranges. It is not unlikely, however, that trains will be run between the capital and Syrian localities by the middle of 1916. Press reports of the past twelve months have also made occasional reference to the construction of a line starting from the Jaffa-Jerusalem tracks and directed towards Egypt. Farther east, track-laying has proceeded on the section of the line advancing northward from Bagdad to meet the advance east of Aleppo. This portion of the Bagdad railroad coincides with the old caravan routes which skirted the northern edge of the sand areas of the Syrian desert and followed thence the valleys of the Tigris and Euphrates.

A hopeful view of the future of Turkey's economic position may be entertained by remembering that the land is still unexploited and that the resources of its soil and subsoil await the handling of Western energy. It is expected that as fine a cereal crop as can be obtained anywhere in the world will be raised in the region between Eskishehir, Angora and Konia. Five million dollars spent by Germans on irrigation at Chumra in the vicinity of the last-named city has proved conclusively that a thriving agricultural industry can be reared on the interior plateau of Asia Minor. The Cilician plain, where cotton and cereals are cultivated, contains vast tracts of swamp land which can be reclaimed. Here, too, irrigation would greatly improve cotton culture. Many of these rich soils are parts of Turkish crownlands which have been estimated by some as attaining one-tenth of the entire area of Turkey. The lands owned by the Evkaf, or Ministry of Religious Foundations, also cover vast areas. Estates held under either of these forms of tenure can be rendered highly productive under Western management. The southernmost end of the Bagdad line taps rich oil fields which are situated in the area of transition between the plateau of Iran and the Mesopotamian depression. The railroad traverses the western end of this oil basin. Its eastern section in Persia has been developed since 1908 by British firms.

The international control of Turkish railroads reflects the transitional character of the land over which they are built. Ownership in Turkish lines is of practically no value to so backward a people as the Turks have proved themselves to be. It is of vital importance to the industrial communities of the countries which hold the extremities of the roads of which the Turkish system is but a link. Germany, Austria or France at the western extremity of the trans-continental line, Great Britain in India at its eastern end, have

interests which affect a large proportion of their population. In the west the great through-line starts in some of the busiest industrial centers of the world. In the east it taps coveted markets. The attention of European manufacturers is directed towards densely populated India or China simply because people spell trade.

L. D.

KRÜMMEL'S HANDBOOK OF OCEANOGRAPHY: A REVIEW*¹

By LUDWIG MECKING, Ph.D.
University of Kiel

Modern oceanography dates from the middle of the last century. At that time an American naval officer, M. F. Maury, published the first comprehensive treatise on the "physical geography of the sea" and became the leading spirit in urging investigation of the sea and its phenomena. As a result of his efforts and in consequence of the awakening interest in marine zoology and the requirements of cable laying, numerous deep-sea expeditions were sent forth during the sixties, culminating during the seventies in the cruises of the *Challenger*, *Gazelle*, and *Tuscarora*. It was the extensive material collected on these trips which was then, in the eighties, scientifically sifted and summarized in a German handbook of oceanography by Boguslawski and Krümmel.

Since then a quarter of a century has passed. In that time the investigation of the sea has developed uninterruptedly. Krümmel himself took an active part in it on the German expedition of the *National*. But during the last quarter of a century, as compared with the preceding twenty-five years, the emphasis lay rather on intensive than extensive research, and rather on investigations of a theoretical than of a practical nature. Methods and instruments, due to the contributions of Nansen, Krümmel, Pettersson and others,

* Translated from the original, written in German for the *Bulletin*.

¹ O. Krümmel: *Handbuch der Ozeanographie*. Vol. I: Die räumlichen, chemischen und physikalischen Verhältnisse des Meeres, 1907. (2nd edit. of Vol. I of "Handbuch der Ozeanographie," by G. von Boguslawski, 1884). xvi and 536 pp. Maps, diagrams, and tables. Vol. II: Die Bewegungsformen des Meeres—Wellen, Gezeiten, Strömungen, 1911. (2nd edit. of Vol. II of "Handbuch der Ozeanographie," by O. Krümmel, 1887). xvi and 766 pp. Maps, diagrams, tables; and index to both volumes. In series: *Bibliothek geographischer Handbücher*, begründet von Friedrich Ratzel: Neue Folge, herausgegeben von Albrecht Penck. J. Engelhorn, Stuttgart.